

```

> type(4, even);
                                true
> type(6, odd);
                                false
> 7 mod 3;
                                1
> modp(7, 3);
                                1
> 8 mod 3;
                                2
> f:=n-> if type(n, even)=true then n/2 else
    3*n+1 end if;
> f(3);
                                10
> f(10);
                                5
> (f@@2)(3);
                                5
> seq((f@@j)(3), j=0..10);
                                3, 10, 5, 16, 8, 4, 2, 1, 4, 2, 1
> seq((f@@j)(7), j=0..20);
    7, 22, 11, 34, 17, 52, 26, 13, 40, 20, 10, 5, 16, 8, 4, 2, 1, 4, 2, 1, 4
> seq((f@@j)(352), j=0..20);
352, 176, 88, 44, 22, 11, 34, 17, 52, 26, 13, 40, 20, 10, 5, 16, 8, 4,
    2, 1, 4

```

```
> seq((f@@j)(27), j=0..130);  
27, 82, 41, 124, 62, 31, 94, 47, 142, 71, 214, 107, 322, 161, 484,  
242, 121, 364, 182, 91, 274, 137, 412, 206, 103, 310, 155, 466,  
233, 700, 350, 175, 526, 263, 790, 395, 1186, 593, 1780, 890,  
445, 1336, 668, 334, 167, 502, 251, 754, 377, 1132, 566, 283,  
850, 425, 1276, 638, 319, 958, 479, 1438, 719, 2158, 1079, 3238,  
1619, 4858, 2429, 7288, 3644, 1822, 911, 2734, 1367, 4102,  
2051, 6154, 3077, 9232, 4616, 2308, 1154, 577, 1732, 866, 433,  
1300, 650, 325, 976, 488, 244, 122, 61, 184, 92, 46, 23, 70, 35,  
106, 53, 160, 80, 40, 20, 10, 5, 16, 8, 4, 2, 1, 4, 2, 1, 4, 2, 1, 4, 2,  
1, 4, 2, 1, 4, 2, 1, 4, 2, 1, 4
```

```
> a[0]:=3; for k from 1 to 10 do  
a[k]:=f(a[k-1]) end do;
```

$$a_0 := 3$$

$$a_1 := 10$$

$$a_2 := 5$$

$$a_3 := 16$$

$$a_4 := 8$$

$$a_5 := 4$$

$$a_6 := 2$$

$$a_7 := 1$$

$$a_8 := 4$$

```

                                a9 := 2
                                a10 := 1
> seq(a[j], j=0..10);
                                3, 10, 5, 16, 8, 4, 2, 1, 4, 2, 1
> k;
                                11
> a[0]:=3; for k from 1 while(a[k-1]>1) do
a[k]:=f(a[k-1]) end do;
                                a0 := 3
                                a1 := 10
                                a2 := 5
                                a3 := 16
                                a4 := 8
                                a5 := 4
                                a6 := 2
                                a7 := 1
> a[0]:=3: for k from 1 while(a[k-1]>1) do
a[k]:=f(a[k-1]) end do:
> print(seq(a[j], j=0..k-1)):
                                3, 10, 5, 16, 8, 4, 2, 1
> for n from 1 to 10 do a[0]:=n: for k from 1
while(a[k-1]>1) do a[k]:=f(a[k-1]) end
do:print(seq(a[j], j=0..k-1)) end do:
                                1

```

```

                2, 1
            3, 10, 5, 16, 8, 4, 2, 1
                4, 2, 1
            5, 16, 8, 4, 2, 1
            6, 3, 10, 5, 16, 8, 4, 2, 1
        7, 22, 11, 34, 17, 52, 26, 13, 40, 20, 10, 5, 16, 8, 4, 2, 1
                8, 4, 2, 1
    9, 28, 14, 7, 22, 11, 34, 17, 52, 26, 13, 40, 20, 10, 5, 16, 8, 4, 2, 1
            10, 5, 16, 8, 4, 2, 1

```

```

> for n from 1 to 10 do a[0]:=n: for k from 1
  while(a[k-1]>1) do a[k]:=f(a[k-1]) end
do:print(n,k-1) end do:

```

```

    1, 0
    2, 1
    3, 7
    4, 2
    5, 5
    6, 8
    7, 16
    8, 3
    9, 19
    10, 6

```

```

> maxiter:=-1: for n from 1 to 100 do
  a[0]:=n: for k from 1 while(a[k-1]>1) do

```

```
a[k]:=f(a[k-1]) end do: if(k-1>maxiter)
then print(n,k-1): maxiter:=k-1: end if end
do:
```

1, 0

2, 1

3, 7

6, 8

7, 16

9, 19

18, 20

25, 23

27, 111

54, 112

73, 115

97, 118

```
> fibo:=n->if n< 3 then 1 else
fibo(n-1)+fibo(n-2) end if;
```

```
> fibo(45);
```

Warning, computation interrupted

```
> fibo:=n->if n=1 then 7 elif n=2 then x else
fibo(n-1)+fibo(n-2) end if;
```

```
> fibo(25);
```

46368 x + 200599

```

> fibo:=proc(n) option remember; if n=1 then 7
  elif n=2 then x else fibo(n-1)+fibo(n-2)
  end if end proc;

> fibo(250);
4880197746793002076754294951020699004973287771475874
  x + 2111289655537109902769910794829543722099086633080\
  3507

> agm:=proc(n) option remember; if n=1 then
  [1, 3] else
  [(agm(n-1)[1]+agm(n-1)[2])/2, sqrt(agm(n-1)[
  1]*agm(n-1)[2])] end if end proc;

> agm(2);
                                     [2,  $\sqrt{3}$ ]

> evalf(agm(7), 50);
[1.8636167832448965423556890310242705951575328568269,
  1.8636167832448965423556890310242705951575328568268]
>

```